Claims

1. Polyurethane resin obtainable by
   a) reacting an excess of one or more aliphatic diisocyanates with a group of isocyanate-reactive components consisting of one or more polyether polyols each having an average molecular weight in the range of not more than 1500 g/mol, and at least one diamine so as to obtain a prepolymer; and
   b) adding a mixture of isophorone diamine and a second diamine selected from the group consisting of ethylenediamine, 1,2-diaminocyclohexane and 2,2,4- or 2,4,4-trimethyldiiaminohexane (TMDA) in excess to the free NCO groups of the prepolymer obtained in step a).

2. Polyurethane resin according to claim 1, wherein in step a) as a further isocyanate-reactive component at least one polyol having an having an average molecular weight of equal or less than 800 g/mol is added.

3. Polyurethane resin according to claim 1 or 2, wherein in step a) the ratio of equivalent weights of diisocyanate components to isocyanate-reactive components is in a range of between 3,6: 1 and 1,1:1, preferably in a range of between 2:1 and 1,1:1.

4. Polyurethane resin according to any of claims 1 to 3, wherein in step b) the ratio of the second diamine to isophorone diamine is preferably 10:1 to 2:1, especially 5:1 to 3:1.

5. Polyurethane resin according to any of claims 1 to 4, wherein in step b) the ratio of equivalent weights of the isocyanate-terminated prepolymer to the mixture of diamine components is in a range of between 1:5 and 1:1,1, preferably 1:4 and 1:1,1.

6. Polyurethane resin according to any of claims 1 to 5, having a weight average molecular weight in the range of 20000 to 80000 g/mol, preferably between 25000 to 55000 g/mol.

7. Polyurethane resin according to any of claims 1 to 6, having a degree of urethanisation between 20 and 30%.

8. Method of forming a polyurethane resin, comprising the steps of
   a) reacting an excess of one or more aliphatic diisocyanates with a group of isocyanate-reactive components consisting of one or more polyether polyols each having an average molecular weight in the range of not more than 1500 g/mol, and at least one diamine so as to obtain a prepolymer; and
   b) adding a mixture of isophorone diamine and a second diamine selected from the group consisting of ethylenediamine, 1,2-diaminocyclohexane and 2,2,4- or 2,4,4-trimethyldiiaminohexane (TMDA) in excess to the free NCO groups of the prepolymer obtained in step a).

9. Method according to claim 8, wherein in step b) the mixture of diamines is added to the prepolymer in two separate steps.

10. Method according to claim 9, wherein in the first step approximately one third to about 50% of said mixture of diamines is added to the prepolymer at elevated temperatures of between 60 and 90°C, and in the second step the balance of said mixture of diamines are added at about 45-50°C.

11. Method according to any of claims 8 to 10, wherein in step a) as a further isocyanate-reactive component at least one polyol having an having an average molecular weight of equal or less than 800 g/mol is added.

12. Method according to any of claims 8 to 11, wherein in step a) the isocyanate-reactive components are added sequentially to the one or more diisocyanates.

13. A coating composition, preferably printing ink, comprising a solvent and at least one polyurethane resin according to one of the claims 1 to 7 as film forming binder.

14. Use of a polyurethane resin according to claims 1 to 7 as at least one film forming binder in printing inks for printing plastic substrates, preferably polyolefinic plastic substrate.

15. Method of producing a laminate carrying a printed layer, said method comprises the steps of

a) providing a coating composition, preferably a printing ink according to claim 13;

b) applying a layer to a first substrate, preferably a plastic foil, by printing said printing ink of step a) in a flexographic and/or gravure printing process;

c) removing said solvent from said layer thereby drying and/or curing said layer obtained in step b),

d) applying an adhesive to the dried and/or cured layer obtained in step c) and producing the laminate by applying at least a second substrate, preferably a plastic foil, on the adhesive.

16. Laminate produced by the method of claim 15.